

**Answers to EXAMPLE 2. HYPOTHETICAL – EXISTING PC-BOILER (1304 MMBTU/HR), AND FACILITY WANTS TO ADD WOOD-FIRED BOILER (90 MMBTU/HR)**

**TOOLS:**

Emissions Factors (EF) based on AP-42:

Pollutant	Emissions Factor (lb/MMBtu)
PM	0.4
SO <sub>2</sub>	0.025
NO <sub>x</sub>	0.22
VOC	0.017
CO	0.6
<b>Greenhouse Gases</b>	
CO <sub>2</sub>	195 lb/MMBtu
CH <sub>4</sub>	0.021 lb/MMBtu
N <sub>2</sub> O	0.013 lb/MMBtu

**PROBLEM SOLVING:**

**Question 1: What would the emissions be for the proposed project?**

Example Calculation:

PM Emissions [tons/yr] =

(90 MMBtu/hr) \* (0.40 lb/MMBtu) \* (8760 hr/yr) \* 1 ton/2000 lb = **157.68 tons/yr**

CO<sub>2</sub> Emissions [tons/yr] =

(90 MMBtu/hr) \* (195 lb/MMBtu) \* (8760 hrs/yr) \* (0.0005 ton/lb) = 76869 tons/yr

**Calculations:**

<b>Calculated Total Emissions from the Wood-Boiler (Tons/Year):</b>								
PM	SO <sub>2</sub>	NO <sub>x</sub>	VOC	CO		CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O
<b>157.68</b>	<b>9.86</b>	<b>86.72</b>	<b>6.70</b>	<b>236.52</b>				

Note: This example did not consider PM<sub>2.5</sub> or PM<sub>10</sub> to try and keep it simple

**Question 2: On a mass basis, what are the total emissions of GHGs?**

CO<sub>2</sub>+CH<sub>4</sub>+N<sub>2</sub>O = Total Emissions of GHG's (on a mass basis, tpy)

**= 76,882 tons/year**

### Question 3: What are the total emissions of CO<sub>2e</sub>?

Step 1: Refer to Global Warming Potential (GWP) Table (Title 40, Part 98, Subpart A, Table A-1)

Step 2: Identify pollutants and their respective GWPs.

Pollutant	Global Warming Potential
CO <sub>2</sub>	1
CH <sub>4</sub>	21
N <sub>2</sub> O	310

$$CO_{2e}(tpy) = \sum (GWP_i \times MassEmissionRate_i(tpy))$$

$$CO_{2e}(tpy) \text{ Example} = (\text{mass } CO_2 * 1) + (\text{mass } CH_4 * 21) + (\text{mass } N_2O * 310) =$$

**78,631 tons/yr**

Calculations [tons/yr] =

Question 4: So, we have

Source	GHGs(mass)	CO <sub>2e</sub>
Existing facility	1218878	1227255
Modification	76882.40	78631

### **APPLICABILITY ANALYSIS:**

**Question 1: Does this action require a Title V permit (e.g. any pollutant > 100 tpy)?**

**This is an existing facility that already has a Title V Permit – Anyway.**

**Question 2: Does the permit action have GHG emissions in excess of thresholds?**

- a. Y Facility emissions  $\geq 0$  TPY GHG mass
- b. Y Facility emissions  $\geq 100/250$  TPY GHG mass
- c. Y Facility emissions  $\geq 75,000$  TPY CO<sub>2e</sub>
- d. Y Facility existing emissions  $\geq 100,000$  TPY CO<sub>2e</sub>

**What are the existing facility's permit requirements?**

**If the Permit Decision occurs before 1/2/2011:** GHG's do not need to be considered

**Step 1: If the permit decision occurs between 1/2/2011 and 7/1/2011:**

#### **Title V**

This is a significant modification to the existing Title V Operating Permit (pursuant to ARM 17.8.1227). The facility would be required to include applicable requirements for both criteria pollutants and GHG.

Keep in mind—the facility must submit an application for modification to the Title V Operating Permit within one year after commencing operation (ARM 17.8.1205).

At this time there are no applicable requirements for GHGs, so the facility would simply need to acknowledge GHGs in the permit application. The Department would then address GHGs in the Technical Review Document attached to the Operating permit. If the facility is subject to PSD (as in this example) then the facility would also need to include any GHG - BACT requirements from the PSD process and associated conditions.

#### PSD

This modification exceeds the significant emission rates for CO and NO<sub>x</sub>. Therefore, the facility would be subject to PSD permitting “anyway” for those pollutants. The facility would also be subject to PSD requirements for GHG because the net emissions increase of GHG mass emissions is  $\geq 0$  tpy, and the net CO<sub>2</sub>e emissions are  $\geq 75,000$  tpy. PSD requirements have not changed for non-GHG pollutants; however, now the facility would be required to conduct a BACT review for GHG.

#### **Step 2: If the permit decision occurs after 7/1/2011:**

#### Title V

The facility would be considered an “anyway” source and the facility GHG mass emissions are  $\geq 100$  tpy and the CO<sub>2</sub>e emissions are  $\geq 100,000$  tpy; therefore, the Title V Operating permit application would need to address GHG. At this time, there are no applicable requirements for GHGs, so the facility would simply need to acknowledge GHGs. The Department would then address GHGs in the Technical Review Document attached to the Operating permit. If the facility is subject to PSD (as in this example) then the facility would also need to include any BACT requirements from the PSD process and associated conditions.

Keep in mind—the facility must submit an application for a Title V Operating Permit within one year after commencing operation (ARM 17.8.1205).

#### PSD

This modification exceeds the significant emission rates for CO and NO<sub>x</sub>. Therefore, the facility would be subject to PSD requirements for those pollutants.

Additionally, the **existing** facility emits or has the potential to emit 100,000 tpy CO<sub>2</sub>e (major source). Additionally, the modification's net GHG mass emissions increase are  $\geq 100$  tpy (for a listed source), and the modification's net CO<sub>2</sub>e emissions are  $\geq 75,000$  tpy; therefore the facility would also be subject to PSD requirements for GHG. The facility would be required to conduct a BACT review for GHG. EPA hopes to have some guidance on GHG-BACT Analysis soon.